Claims 1, 11, 22, 45-52, 56, 57, 82, 83 and 95 were objected to because of informalities. In response, those informalities have been overcome by the above amendments.

Claims 1-25, 45-58, 80-89 and 95 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite. In claim 1, the terms "immediately prior to" were unclear as to their context of time. Claim 1 has accordingly been amended to include the words "at the time of", which we believe to be more clearly stated. In respect to claims 1, 13, 46, 82, 83, and 86, the x y and z directions are unclear since no origin or coordinate system has been claimed or defined. Those claims have been amended accordingly to more clearly state the particular directions involved. In this regard, on page 19 of the specification, a coordinate system is defined, with such description providing support for the claims as now recited. In respect to claim 82, the Examiner indicates that it is unclear what is intended to be claimed. In this regard, the Examiner is incorrect in his assertion that "if there is no contact between the subassemblies then the subassemblies can't be soldered together". For the soldering process to occur, it is only necessary that the two subassemblies are in close proximity to each other. In respect to the preferred embodiment, the pin passes into a hole, with no contact between the two elements. A solder is placed between the two elements and solidifies to bond the two together.

In respect to claim 89, the Examiner says that "it is unclear in its given context how many holes are claimed. Furthermore, it is unclear how a hole in claim 89 is functionally related to the rest of the invention". In claim 63, on which claim 89 depends, there is recited that one solderable surface is made in the configuration of a hole. As such, there is no limitation as to the depth of the hole. Claim 89 therefore adds the feature that the hole passes all the way through the subassembly.

In respect to claim 95, the Examiner indicates that it unclear what "a component part consist of". Accordingly, claim 95 has been amended to more clearly recite this feature in terms of portions.

Referring now to the rejections of the claims on the basis of the prior art, claims 59, 61-64, 66, 68-71, 89-92 are rejected under 35 U.S.C. 102(b) as being anticipated by Kanaya et al., (U.S. Patent 5,155,401). Claims 1, 2, 4, 7, 12, 13, 15, 18, 23, 24, 26-28, 31-33, 35, 37, 46, 47, 49, 52, 53, 55, 57, 80-83, 86-88, 95, 96, 98,

101-103, 105 and 106 are rejected under 35 U.S.C. 102(e) as being anticipated by Kropp (U.S. Patent 5,902,997). Claims 73, 74, 76-78, 93 and 94 are rejected under U.S.C. 102(e) as being anticipated by Christensen (U.S. Patent 5,753,908). Claim 3, 5, 6,8-11, 14, 16, 17, 19-22, 25, 29, 30, 34, 36, 45, 48, 50, 51, 54, 56, 58, 84, 85, 97, 99 100, 104, 107 and 108 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kropp.

In response, the applicants have amended the claims and have reviewed the cited references in detail and believe them to be non anticipatory of the present invention as now claimed for the reasons to be discussed hereinafter.

The present invention comprises a method and apparatus for establishing a desired spacial relationship between an image sensor subassembly and an optical subassembly. That desired relationship is not necessarily a fixed distance between the two components, but will tend to vary even with same batch components. Accordingly, the desired relationship is determined by the actual performance of the components as they are selectively spacially moved until a desired image quality results. At that time, their relative positions are fixed by a soldering process. However, at the time that the soldering occurs, the two components are not limited in their movement toward each other but are free to be moved until they arrive at the point where the proper performance is obtained.

The Kanaya reference shows and describes a recorder motor having a coded disk 32 secured to the motor shaft with an image sensor 33 in close proximity thereto for detecting the rotational angle of the coded disk 32. The positioning of the coded disk 32 relative to the coded sensor 33 is accomplished by selectively positioning the coded disk 32 on the motor shaft, and by selectively positioning, and soldering, both the sensor 33 with respect to a circuit board 35, and the circuit board 35 with respect to the motor terminals 28 and 29.

The Kropp reference shows a method for obtaining proper spacing between a lens and an optoelectronic component. Mounted on a base plate 1 is an optoelectronic 2 having a plurality of optically active zones 4a-4d thereon. These optically optic zones are to be aligned with respective lenses 12a-12d on a lens body spaced therefrom. The proper relative positioning of the two components is obtained in one plane by coordinating an optically active zone 4e with a

protuberance highest point 21, in the "A" direction (see Fig. 1), and in another plane by the engagement of the protuberances 18 and 19 with the face of the optoelectronic component 2 to obtain the proper spacial distance "B" as shown in Figs. 1 and 2 . Thus, unlike the present invention, the relative positioning of the two components is a fixed measured distance that will be a constant distance as determined by the length of the protuberances 18 and 19. After the optoelectronic component 2 has its face engaging the protuberances 18 and 19 (thereby limiting any further relative movement between the two components), then the optoelectronic component is secured to the base plate 1 by an adhesive or solder applied at point 35, for example.

The Christensen reference shows an imaging device including a retina board 80 upon which a linear photo sensor array 52 is mounted, with the board 80 being attached by screws 24 to a scanning carriage 10 that include lenses 20 and 22. The screws 24 pass through a pair of over sized holes 82 and 84 in the board 80 such that the board 80 can move relative to the scanning carriage 10 to allow adjustments for the first, second and third degrees of freedom as shown at 30, 32 and 34 of Fig. 5. As will be seen in Fig. 6, adjustments of the focus between the lens 22 and the photo sensor array 52 is made by moving the lens 22 in a fourth degree of freedom 36. Adjustment in the fifth degree of freedom 38 is obtained by movement of the retina board 50 by adjusting the screws 150 and 152. Of the five degrees of freedom, it is thus only the fourth degree of freedom which is comparable to the present invention, and as described hereinabove, Christensen only suggest that the lens 22 be positionally adjusted with respect to the photo sensor array 52. But he does not describe or suggest how that is accomplished or how those elements are positioned and fixed in place.

Referring now to the Examiner's objections on the basis of Kanaya, the Examiner refers to the motor terminals 28 and 29 as being the solder receiving interface between the printed circuit and the optical subassembly. Accordingly, the optical subassembly must include not only the disk 32 and its carrying shaft 17, but also the receiving member 39, the shaft 17, the bearings 15 and 16, the rotor 18, the rotor magnets 19, and the excitation coils 20 and 21. Inasmuch as these various elements are relatively moveable and not collectively rigid, the soldering of the

circuit board 35 to the motor terminals 28 and 29 does not ensure that there will be no movement between the disk 32 and the image sensor 33.

Referring now to claims 59 and 66 as amended, the optical subassembly is recited as being substantially rigid, thus ensuring that once the two subassemblies are soldered together, there will no movement between the image sensor and the optical element. This is to be contrasted with Kanaya wherein the structure between the motor terminals 28 and 29 and the disk 32 is relatively moveable.

In respect to the 102(e) rejections on the basis of Kropp in paragraph 8 of the Office Action, the Examiner says with respect to that reference that "the instant before the two subassemblies touch prior to soldering, there is no contact to prevent movement of the subassemblies relative to each other". But, inconsistent with the claims as now amended, at the time of the soldering, three is contact between the subassemblies. The protuberances shown at 18 and 19 of Fig. 1 and at 40a and 40b in Fig. 4 are integrally a part of the lens body shown at 10 and 44, respectively. The spacial distance between the lenses and the optically active zones, are established by the protuberances which, at the time of the soldering process, prevent the optoelectronic component 2 from being moved any further toward the lenses. This is in contrast to the present invention wherein there is no restriction on the relative movement between the two components because, rather then a particular distance as is desired in the Kropp reference, the present invention is dependent on allowing variable distances in order to obtain the proper imaging performance.

In respect to claims 95 and 96, the Examiner says that Kropp allows the aligning of the subassemblies "without the main parts of the subassemblies touching each other". In this regard, claim 1, as amended, cites that no portion of the image sensor subassembly comes in contact with a portion of the optical subassembly. Clearly this is not true in the case of the Kropp reference.

In respect to claims 13, 82 and 83, the Examiner says that, "the instant before the two subassemblies touch and prior to soldering, the subassemblies can be moved freely as claimed". Again, with the amended claim language, that point is moot for the same reasons as discussed hereinabove.

In respect to claims 26 and 81, claim 26 has been amended to more specifically recite the hole and pin structure and their relationship. This claim is

therefore clearly distinguished over the Kropp reference wherein the protuberance 46 comes in contact with the annular markings 52 prior to the welding process.

Claim 81 is dependent on various claims including claim 1 which is patentable for the reasons discussed hereinabove.

In regard to claims 32 and 80, the Examiner states that "Kropp further discloses (see Fig. 4) the solderable surface consisting of an pin (46) having a substantially uniform-diameter body". The applicants disagree. The element 46 in Fig. 3 which is misnumbered as items 40a and 40b in Fig. 4, is a convex protuberance and does not have a substantially uniform-diameter body but has a diameter that varies continually through its length. In this regard, the Examiner's comment with respect to "compared to the width of the subassembly, the pin has a substantially uniform-diameter", is not understood.

In regard to claims 46, 47 and 86, again, the Examiner states that "the instant before the two subassemblies touch and prior to soldering, the subassembly can be moved freely as claimed". As discussed hereinabove, the alignment process of Kropp depends on the one subassembly coming in actual contact with the other subassembly, thereby indicating the proper spacing.

With regard to the 102(e) rejections on the basis of Christensen, as set forth in paragraph 9 of the Office Action, the Examiner appears to be stating that the printed circuit board 80 is a part of the optical subassembly 10. If one chooses this construction, then, as shown in Fig. 4, the sockets 90 and 100 which are soldered into the printed circuit board 80, must also be considered part of the "optical subassembly". Then, there is no "solder receiving interface between the substantially rigid planar member and the optical subassembly" as suggested by the Examiner. The interface is rather by a way of "Pins in Carrier Type IC Socket" arrangement as described in lines 33-47 of column 5. That is, the solder interface is on the "optical subassembly" as defined by the Examiner, but it is not "between" the rigid planar member and the optical subassembly as recited in the applicant's claims.

In respect to the rejection of claims on the basis of 103(a) as unpatentable over Kropp as set forth in paragraph 11, all of the claims mentioned are dependent on other claims which are believed to be patentable for the reasons discussed hereinabove.

In view of the amendments and the discussion hereinabove, the applicants believe that the claims are patentable distinguishable over the cited references. A reconsideration of the Examiner's rejections and a passing of the case to issue is therefore respectfully requested.

If the Examiner believes that contact with Applicant's attorney would be advantageous toward the disposition of this case, the Examiner is herein requested to call Applicant's attorney at the phone number noted below.

The Commissioner is hereby authorized to charge any additional fees associated with this communication or credit any overpayment to Deposit Account No. 50-0289.

Respectfully submitted,

WALL MARJAMA & BILINSKI LLP

By: _____

Dana F. Bigelow

Reg. No. 26,441

DFB/cmh

Telephone: (315) 425-9000

Customer No.:

20874

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